Instructions: Complete each of the following as practice.

1. For each symmetric matrix M below, compute an orthogonal matrix Q and a diagonal matrix D for which $M = QDQ^\top$.

   (a) $\begin{bmatrix} 6 & 2\sqrt{3} \\ 2\sqrt{3} & 7 \end{bmatrix}$

   (b) $\begin{bmatrix} 3 & 1 \\ 1 & 3 \end{bmatrix}$

   (c) $\begin{bmatrix} 6 & -2 \\ -2 & 3 \end{bmatrix}$

   (d) $\begin{bmatrix} -2 & 0 & -36 \\ 0 & -3 & 0 \\ -36 & 0 & -23 \end{bmatrix}$

   (e) $\begin{bmatrix} 2 & -1 & -1 \\ -1 & 2 & -1 \\ -1 & -1 & 2 \end{bmatrix}$

   (f) $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

   (g) $\begin{bmatrix} 3 & 1 & 0 & 0 \\ 1 & 3 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

   (h) $\begin{bmatrix} -7 & 24 & 0 & 0 \\ -24 & 7 & 0 & 0 \\ 0 & 0 & -7 & 24 \\ 0 & 0 & 24 & -7 \end{bmatrix}$